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A CASE OF PERSISTENT MELANISM.

H. E. EWING.

The occurrence of melanism is a phenomenon of wide distribution in nature, being recorded among animals belonging to a great many classes and orders. Our records show that while the occurrences are frequent and are found in species belonging to many of the larger zoölogical groups, yet the actual numbers of melanic individuals found among the individuals of any one species, in any one region is usually extremely small in comparison with the total number of normally colored individuals of the same species found in the same region. Because of this rarity of these black-colored individuals the appearance of melanic forms has been very generally regarded as being due to sporadic though at times oft-repeated, sporting. Such melanic forms do not usually persist racially. It was Darwin who years ago noted that sports of almost all kinds were ruthlessly eliminated in the struggle for existence; and sporting in the form of melanism apparently has offered no exception to this general rule.

Perhaps one of the best examples of the racial persistence of melanism is that of the melanic form of the moth, *Amphidasy betularia*, which existed as a rarity in England some years ago, but which now has replaced the typical form about some of the manufacturing districts. This persistence of melanism has been explained on account of the environment in these districts being changed by the smoke from factories which darkens the vegetation in general, by the killing of lichens and by the depositing of black soot, and in this manner gives an advantage to the melanic forms by making them less conspicuous than the normally colored individuals.

THE APPEARANCE OF MELANIC ROSE CURCULIOS.

During the summer of 1913, while in the Willamette Valley in western Oregon, I came across instances of melanism among

individuals of one of our common beetles that were quite striking. We have in the Willamette Valley, as in almost all other sections of the country, the well-known rose curculio, *Rhynchites bicolor* Fab., which feeds chiefly upon the buds and flowers of wild and of cultivated roses. It will feed, however, upon a few other plants, especially the buds of wild blackberries, which grow so abundantly along the streams in western Oregon.

This weevil is about one fourth of an inch long, and in all the sections of the country where it has been observed outside of the Willamette Valley is of a red color above; while the underparts of the body, and sometimes the head and beak, are black. The red in some instances extends forward so as to include the head and beak. When viewed feeding on the roses, the dark under surface of the body is largely concealed so that the weevil appears almost entirely red.

The red color of the dorsal surface is possibly protective to the species when it is feeding on the petals of wild or cultivated roses, as the color harmonizes with the red of many roses, and for this reason might make the individuals much less conspicuous objects to hungry birds and other enemies.

I found feeding along with the red individuals of *Rhynchites bicolor* Fab. individuals which were totally black. At first I suspected that these black individuals were of a different species. Upon looking the matter up I found that they had in a few instances been collected, and were called *Rhynchites aeneus* Fab., a black species, which is common in the eastern part of the country.

During the summer of 1913 I demonstrated that the two forms would breed together in captivity. However, of the several larvæ that I obtained from the eggs deposited none reached maturity. Following these experiments I made a critical study of the characters of our two forms found in Oregon, and failed to observe any differences in structure whatever, hence considered the black ones only as melanic individuals of the common rose curculio. In order to get the opinion of a specialist in Coleoptera, I showed specimens of the two forms to Dr. Van Dyke, of the University of California. He stated that the two were the same, and that the black form found in Oregon was not the *Rhynchites*

aeneus Boh. of the eastern states. I may here add that the real *Rhynchites aeneus* Boh. is a very hirsute species; it has well-developed punctate striations on the elytra, and prominent marginal elytral grooves. Our black Oregon form has none of these characters pronounced,—the hairs are very small, the punctations in the elytral striae are almost obsolete, and the marginal grooves of the elytra can hardly be noticed.

MATING AND OTHER HABITS.

During the spring and summer of 1914 I made many field notes on these two forms of *Rhynchites*. I found that the two were constantly associated. They fed together in the same way on the same rose bushes and even on the same buds. They were found to feed together on wild blackberries; they emerged from winter quarters at the same time, and, finally, they were repeatedly found to be interbreeding in nature.

ATTEMPTS AT REARING HYBRIDS.

Four of the individuals of the black form which were found mating in nature with red individuals were confined with their red mates in separate breeding cages. Here they continued to breed for over a month, after which they began to die. In the meantime the females had laid large numbers of eggs; but out of this large number, including several score, I am very sorry to state that I did not succeed in rearing a single individual to maturity. The whole trouble this year was that the buds of the roses soon died after they were punctured by the female, and fell to the ground, taking with them the developing larvæ. In these dead, shriveled rose-buds the larvæ invariably died. Even their transference to fresh rose-buds was of no use, for they would not stay in these buds when placed there artificially. None of these larvæ pupated.

It may be well to state that in all the literature which I have examined I have failed to find a single record of this weevil being reared from the egg to its adult state. Its life history has not been worked out by complete breeding experiments, although repeated field observations, together with fragmentary notes on the life history, have shown that it produces but a single brood a year and hibernates in the adult stage.

MATING STATISTICS.

Having been foiled in my attempts at breeding these beetles, I decided to attack the problem from a different standpoint, namely, to observe the mating habits in nature, to see if the black individuals mated as freely with the red ones as with those of their own color. During the months of May and June I made fourteen different observational trips to some patches of wild roses at the west end of the town of Corvallis, Oregon. I collected every pair that was observed mating, as well as those that were not observed mating; these were collected so as to obtain population statistics. The results obtained were as follows:

Total number of matings observed	53
Normal <i>Rhynchites bicolor</i> × normal <i>Rhynchites bicolor</i>	44
Melanic form × melanic form	0
Normal <i>R. bicolor</i> ♂ × melanic form ♀	3
Melanic ♂ × normal <i>R. bicolor</i> ♀	9

Thus we find that out of the total number of matings observed in nature, 83 per cent. were between normally colored individuals, while 16 per cent. were between melanic individuals and normal ones; no matings being observed between two melanic forms.

Although we can not prove anything in regard to the exact status of these two forms of *Rhynchites* from these observations alone, yet we may speculate, somewhat, in regard to a few points. They tend to indicate:

1. That the normal intergeneration of these two forms is followed by the segregation of the characters following the dominance in the first cross.
2. That the black form is recessive to the red.
3. That racial characters have become fixed without natural barriers, without isolation of any kind or without change of habit but purely through the segregation of the characters in the germ plasm.

POPULATION STATISTICS.

The population statistics obtained for the same patches of wild roses that the mating statistics were obtained from, and at the same time are as follows:

<i>Rhynchites bicolor</i> Fab., normal.....	588
Black form.....	68
Total for both forms.....	<u>656</u>

Thus out of the total of 656 individuals counted, 68, or 11 per cent. were melanic. This percentage is so large that I think that no one would suspect the occurrence of melanism in this species to be due to the sudden sporting of a great many individuals, but rather to the persistence of melanism through segregate inheritance of the melanic types from a few or even a single sport progenitor. In other words either melanism or other characteristics associated with it in this instance have been advantageous to the black forms under the particular conditions of the Willamette Valley to such an extent that a black or melanic race has been evolved in direct competition with the normal type of the species from which it sprang, and has not been ruthlessly eliminated as a race as is usually the case with melanic forms.

The future of this black race of rose curculios will be interesting to watch. I hope to be able soon to breed these forms successfully, and also hope to be able to ascertain what the conditions are in the Willamette Valley which apparently make melanism advantageous to this curculio. A description of this melanic form is here given. Even in the Willamette Valley its distribution differs from that of the normal *R. bicolor*.

Rhynchites pullatus new variety, or species.

All the individuals as yet observed are black throughout. Body and appendages clothed with very fine short hairs which are not noticeable with the naked eye. Snout subequal to the tibia of the first pair of legs in length, bent almost straight downward in the male, but extending forward so as to be plainly visible from above in the case of the female. The antennæ arise from a position a little in front of the middle of the snout in the male and a little behind the middle of the snout in the female. Antennæ well clothed with hairs; three distal segments much broader than the others and forming a club. Dorsal surface of thorax punctate. Around the margins of each elytron is a distinct groove. The longitudinal punctate lines are rather indistinct, and may be wanting. Femora of anterior legs somewhat swollen. Length of body excluding snout, 5.5-7.0 mm.